

ENTOMOLOGY.—*The North and Central American spider parasites of the genus Pseudogaurax (Diptera: Chloropidae).*<sup>1</sup> DAVID G. HALL, Bureau of Entomology and Plant Quarantine. (Communicated by C. F. W. MUESEBECK.)

Black widow spiders (*Latrodectus mactans* F.) have received much attention in the daily press of the United States during the past several years, and parasites of these spiders have become of general interest. Reproductions of photographs showing biological phases in the life history of one of these parasites of the black widow spider have received wide circulation in two popular monthly magazines, under an erroneous name.

The life history of no species of *Pseudogaurax* has been studied fully. The egg, larva, pupa, and adult of *Pseudogaurax anchora* Loew were figured by Howard.<sup>2</sup>

Eggs of some species belonging to this genus are known to be deposited upon the silken strands of egg sacs of spiders, on the cocoons of lepidopterous insects, or on egg masses of mantids. The larvae penetrate the coverings and destroy the contents. When full grown the larvae pupate within the cocoon or egg mass, or on the silk of the egg sac.

The late F. W. Stickney of the Bureau of Entomology and Plant Quarantine, during his investigations in southern California found cocoons of the black widow spider to be highly parasitized by *Pseudogaurax signatus* Loew. This species has been reared many times from egg sacs of the black widow spider in numerous localities in the southern part of the United States.

A key to separate the known North American and Central American species of *Pseudogaurax*, descriptions of four previously undescribed species, and illustrations of the dorsal thoracic color markings of seven species are presented herewith. The material upon which this paper is based is all in the U. S. National Museum.

#### PSEUDOGAURAX Malloch

*Pseudogaurax* Malloch, 1915, Proc. Ent. Soc. Wash. 17: 159 (not Duda, 1930). (Genotype, *Gaurax anchora* Loew, by original designation.)

As pointed out by Malloch<sup>3</sup> in his key, the genus *Gaurax* previously included two distinct groups, one with the scutellum rounded and convex and the other with the scutellum elongate and dorsally flattened. For the group

<sup>1</sup> Received March 13, 1937.

<sup>2</sup> HOWARD, L. O. *The insect book*, p. 184, fig. 106, 1902.

<sup>3</sup> MALLOCH, J. R. *Can. Ent.* 46: 116. 1914.

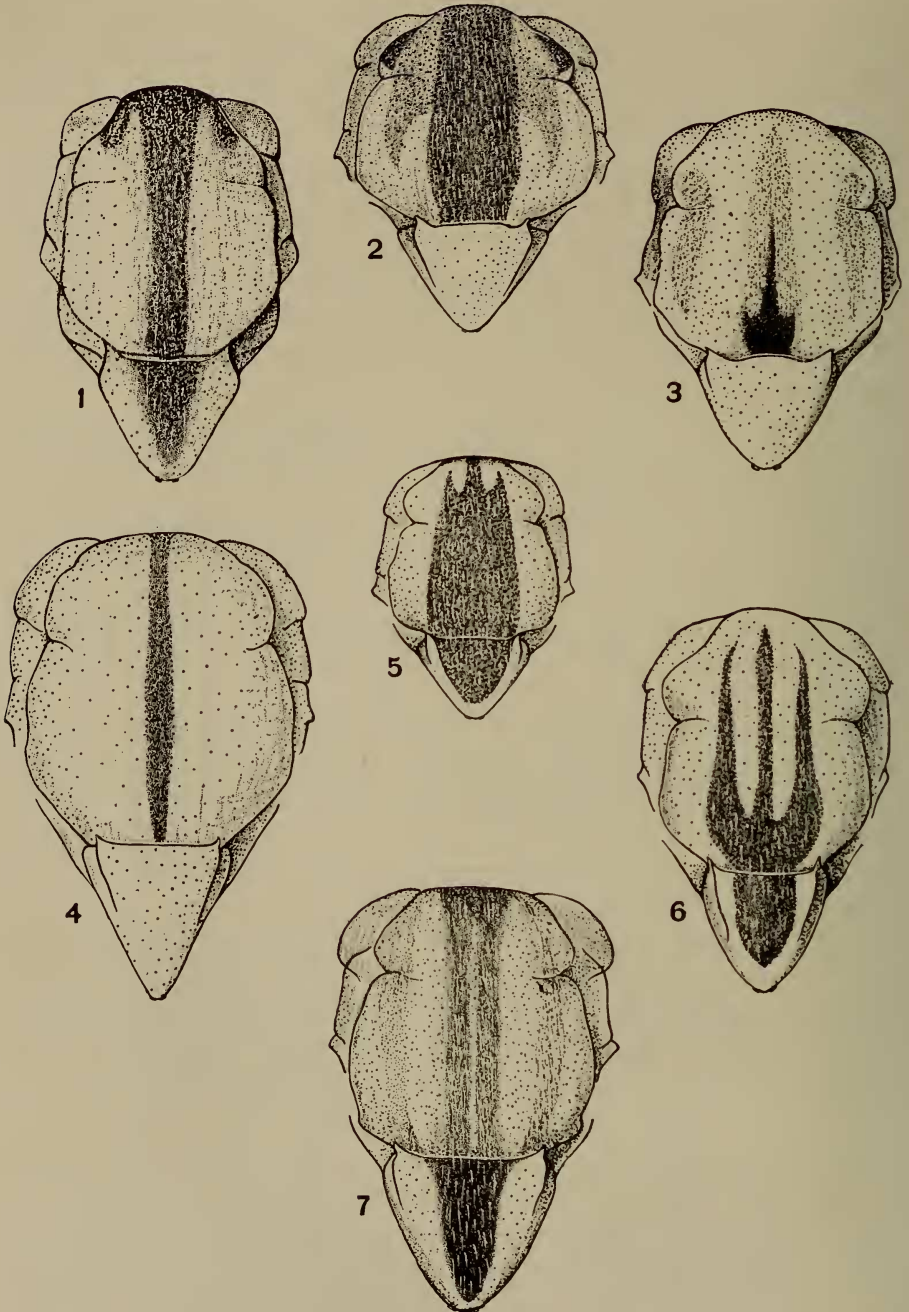


Fig. 1.—*Pseudogaurax anchora* (Loew). Dorsum of thorax. Fig. 2.—*Pseudogaurax misceomaculata*, n. sp. Dorsum of thorax. Fig. 3.—*Pseudogaurax lancifer* (Coq.) Dorsum of thorax. Fig. 4.—*Pseudogaurax unilineata*, n. sp. Dorsum of thorax. Fig. 5.—*Pseudogaurax latimaculata*, n. sp. Dorsum of thorax. Fig. 6.—*Pseudogaurax lyricea*, n. sp. Dorsum of thorax. Fig. 7.—*Pseudogaurax signata* (Loew) Dorsum of thorax.

of species with the convex scutellum he erected the genus *Neogaurax*, with *Gaurax montana* Coq. as genotype. Discovering later (1915) that he had re-named the typical *Gaurax*, he named the group with the elongate scutellum *Pseudogaurax*, with *G. anchora* Loew as genotype, synonymizing *Neogaurax* with *Gaurax*.

*Generic characters.*—*Head.* Eyes with long pile, higher than long, emarginate posteriorly; frontal triangle with a single marginal row of setae; front irregularly setose; parafrontals each with a row of setae near eye, these descending nearly to the antennal insertion; bucca short and with a row of rather long setae along edge; epistoma slightly protuberant; clypeus slightly depressed; antenna with first segment short, second segment about 4 times as long as first and with long hair, especially along the inner edges, and a single longer seta dorsally; third segment ovate, higher than long, covered with abundant, short, curling hair; arista short plumose throughout its length, the rays from 2 to 4 times as long as the greatest diameter of the style; inner vertical bristles 1; outer vertical bristles 1, long and distinct; ocellar bristles reclinate. *Thorax* thickly covered with long, scattered, light-colored hair; posthumeral bristles arranged 1:2; postalar bristle 1. Scutellum flattened above, elongate, and ending in an obtuse point, with long apical setae arising from protuberant bases near the apex. *Wing* with costa extended to tip of fourth vein, fifth vein with a distinct flexure. *Legs* rather densely hairy, the hind tibia with an oval, smooth, velvety (sensitory?) area on the inner side.

As stated above, the genus *Pseudogaurax* differs from *Gaurax* in that the scutellum is elongate and flattened above, ending in a more or less obtuse point and with elongate apical bristles situated on approximated tubercles. In addition to these differentiating characters, the scutellum lacks elongate marginal setae. The genus differs most obviously from *Eugaurax* Malloch, in that *Eugaurax* has the posthumeral bristles arranged 2:3 or more, never 1:2 as in *Pseudogaurax*.

The species of *Pseudogaurax* that fall here are exceedingly similar in many respects and differ mainly in thoracic maculation and in thoracic proportions. These characters are so obvious that I have figured the dorsum of the thorax of each species.

*Pseudogaurax* Duda is distinct from and preoccupied by *Pseudogaurax* Malloch. The following disposition of it is made:

MIMOGAURAX, new name

*Pseudogaurax* Duda, 1930, Folia Zool. Hydrobiol., 2 (3): 86. (Preoccupied by *Pseudogaurax* Malloch, 1915.) Genotype, *Gaurax interruptus* Beck.

KEY TO SPECIES OF PSEUDOGAURAX FROM  
NORTH AMERICA AND CENTRAL AMERICA

1. Scutellum dorsally clear yellow..... 2  
    Scutellum with black markings dorsally..... 4
2. Dorsum of thorax with wide, blackish brown, longitudinal maculations,  
    small lateral presutural spots, the latter more or less connected to the  
    broad central stripe by infuscated areas. Thoracic length, scutellar

- length, and thoracic width in the proportion of 23:7.5:20. Puerto Rico.....*miscemaculata*, n. sp.  
 Dorsum of thorax with a single mid-dorsal longitudinal stripe.....3
3. Mid-dorsal longitudinal stripe of thorax not extending full length of thorax and broadening more or less before scutellum. Thoracic length, scutellar length, and thoracic width in the proportion of 25:8:19. Puerto Rico, West Indies.....*lancifer* Coq.  
 Mid-dorsal longitudinal stripe of thorax extending full length of thorax and narrow throughout. Thoracic length, scutellar length, and thoracic width in the proportion of 33:11:22. Panama.....  
 .....*unilineata*, n. sp.
4. Mid-dorsal longitudinal stripe of thorax relatively narrow, broadening anteriorly and extending into two shorter lateral stripes which do not reach posteriorly to the suture. Thoracic length, scutellar length, and thoracic width in the proportion of 28:8:18. Mass., Md., Va., Fla., O., Ind.....*anchora* Loew  
 Color pattern of thorax not as above.....5
5. Dorsum of thorax with a single, wide, longitudinal stripe. Thoracic length, scutellar length, and thoracic width in the proportion of 15.3:4.5:11.25. Panama.....*latimaculata*, n. sp.  
 Dorsum of thorax with more than one longitudinal stripe.....6
6. Dorsum of thorax with three longitudinal stripes in the shape of an inverted fork or the frame of a lyre. Thoracic length, scutellar length, and thoracic width in the proportion of 27:8:18. Costa Rica.....  
 .....*lyrica*, n. sp.  
 Dorsum of thorax variable, usually with several indistinct, reddish orange to brown, longitudinal stripes, the scutellum always with a well-defined, dark-brown to black, dorsal spot. Thoracic length, scutellar length, and thoracic width, in the proportion of 30:11:20. Calif., Tex., Tenn., N.C., Va., Md., Mexico.....*signata* Loew

**Pseudogaurax anchora (Loew)**

*Gaurax anchora* Loew, 1866, Cent. 7 (94): 51; Williston, in Forbush and Fernald, 1896, Report on Gypsy Moth, p. 387; Coquillett, 1898, Bull. 10: 71, n. ser., Div. Ent., U. S. Dept. Agri.; Howard, 1902, Insect Book, p. 184, fig. 106; Williston, 1908, Manual of North American Diptera, p. 311; Becker, 1912, Mon. Chlor. 4: 75; Johnson, 1913, Dipt. Fla., p. 87; Psyche 20: 35.

*Pseudogaurax anchor* [Loew], Malloch, 1915, Proc. Ent. Soc. Wash., 17: 159; Johnson, 1925, Proc. Bost. Soc. Nat. Hist., p. 99; Auten, 1925, Ann. Ent. Soc. Amer. 18: p. 244; West, 1928, N. Y. State List Ins., p. 861.

*Male and female*.—*Head* yellow; eyes reddish brown; arista and ocellar spot black. *Thorax* yellow, dorsum of thorax with brownish-black maculations as in Fig. 1; postscutellum black. *Abdomen* dorsally with first segment yellow, posterolaterally dark brown; second segment laterally dark brown to black, third and fourth segments dark brown to blackish laterally, sometimes lighter; venter yellow. *Wing* hyaline, veins yellow; haltere lemon yellow. *Legs* whitish yellow.

*Type*.—In the Museum of Comparative Zoology, Cambridge, Mass.

*Remarks*.—The National Museum collection contains 1 female, Weston, Mass., July 23, 1911; 1 female, Beverly, Mass., Aug. 27, 1909; 2 females, Rock Ledge, Fla., Feb. 6 (C. V. Riley); 2 females, Riggs Mill, Ind., May 15,



1914, "ex cocoon *promethea*" (G. W. Barber); 1 female, Hagerstown, Md., Aug. 2, 1918, "in cocoon of *Heterocampa leucostigma*" (Pennington); 1 female, Falls Church, Va., May 15 (Banks); 2 males and 4 females, Falls Church, Va., Jan. 26, 1930, "from cocoons of *promethea*" (Cushman).

This species has been reared upon numerous occasions from lepidopterous cocoons but whether it is a parasite or a scavenger has not been ascertained. All of the reared specimens in the National Museum collection were reared from cocoons of Lepidoptera. The notes upon such specimens indicate that the collectors believed the species to be parasitic.

***Pseudogaurax misceomaculata*, n. sp.**

*Male*.—Like *anchora* except as noted in the key and in thoracic maculations as illustrated in Fig. 2. The species also differs from *anchora* in having a brownish black anterior and a smaller posterior mesopleural spot, in having the postscutellum decidedly glossy black with a smaller darkened area laterally, and in having the abdomen almost black.

*Type locality*.—Bayamon, Puerto Rico.

*Type*.—United States National Museum no. 51942.

*Remarks*.—One male labelled "on leaves of *Flamboyant*," Jan. 28, 1934 (San Juan accession no. 5135B), collected by C. G. Anderson.

***Pseudogaurax lancifer* (Coq.), n. comb.**

*Gaurax lancifer* Coquillett, 1900, Proc. U. S. Nat. Mus. 22: 265; Becker, 1912, Mon. Chlor. 4: 76; Wolcott, 1923, Ins. P. R., p. 232; 1927, Ent. D'Haiti, p. 329; Duda, 1930, Folia Zool. Hydobiol. 2 (1): 87.

*Male and female*.—As in *signatus* except as noted in key and in maculations of the thorax as illustrated in Fig. 3. It also differs from *signata* in having the arista black, in possessing an additional brown spot on the posterior part of the mesopleura, in having the postscutellum but slightly darkened, and in having the legs clear light lemon yellow.

*Type*.—U. S. National Museum no. 4384.

*Remarks*.—The National Museum collection contains the type-series of 8 specimens "from spider's eggs," Puerto Rico, Feb. 9, 1899 (Busck), and 5 specimens "from spider's eggs," Montserrat, West Indies, March 16 (Hubbard); also 5 specimens, "spider parasites," Port Cangrejos, Puerto Rico, June 1, 1920 (Wolcott), and 1 specimen "on guava leaf," Barceloneta, Puerto Rico, Apr. 25, 1933 (Mills and Anderson).

This species appears to have much the same type of biology in the West Indies as *signata* has in the United States. It was reared in Puerto Rico in considerable numbers from the egg clusters of the spider *Gasteracanthia cancriformis* by G. N. Wolcott and forwarded to the National Museum under his accession number 333-21.

***Pseudogaurax unilineata* n. sp.**

*Male and female*.—Like *signata* except as noted in the key and in thoracic maculations as illustrated in Fig. 4. It further differs from *signata* in having the arisal style yellowish, the anterior mesopleural spot more diffused and extended over a wider area, the tibiae more decidedly brownish, and also in the maculations of the yellow abdomen which are as follows: First segment

yellow except for posterolateral darkened spots; second segment with larger posterolateral areas; third segment dark brown to black; fourth segment anterolaterally yellow, posterior margin yellow; venter entirely yellow.

*Type locality*.—Canal Zone, Panama.

*Type*.—Female, United States National Museum no. 51943.

*Remarks*.—Described from a holotype female and 13 paratype male and female specimens reared "from spider's nest," Ancon, Canal Zone, Panama, Oct. 20, 1923 (Zetek), and 1 paratype specimen, Alhajuelo, Canal Zone, Panama, March 18, 1912 (Busck).

#### *Pseudogaurax latimaculata* n. sp.

*Male and female*.—Like *anchora* except as noted in the key and in thoracic maculations as illustrated in Fig. 5. The species also differs from *anchora* in having the ocellar spot more extensive, in the postscutellum, which is yellow, and in the second, third and fourth abdominal segments of the abdomen, which are dark brown to black.

*Type locality*.—Alhajuelo, Panama.

*Type*.—Female, United States National Museum no. 51945.

*Remarks*.—Described from the holotype female and 1 paratype male collected March 12, 1912, Alhajuelo, Panama (Busck).

#### *Pseudogaurax lyrica*, n. sp.

*Male and female*.—Like *signata* except as noted in the key and in the light and dark pattern on the dorsum of the thorax as illustrated in Fig. 6. Also, the postscutellum is yellow, not brown or black, the wing veins are dark, not yellow, the legs are clear lemon yellow, and the abdomen is distinctly blackened.

*Type locality*.—Higuito, San Mateo, Costa Rica.

*Type*.—Female, United States National Museum no. 51944.

*Remarks*.—Described from the holotype female, and 4 paratype male and female specimens collected in Costa Rica by Pablo Schild.

#### *Pseudogaurax signata* (Loew), n. comb.

*Gaurax signatus* Loew, 1876, Zeitsch. Ges. Naturwiss., p. 338; Becker, 1912, Monogr. Chlor. 4: 75; Duda, 1930, Folia Zool. Hydobiol. 2: 87.

*Gaurax araneae* Coquillett, 1896, Ent. News, 7: 320; 1896, Bull. 10: 72, n. ser. Div. Ent., U. S. Dept. Agr.

*Gaurax signatus* var. *mallochi* Duda, 1930, Folia Zool. Hydobiol., 2 (1): 87.

*Male and female*.—*Head* yellow, eyes reddish brown; ocellar spot black; arista dark brown. *Thorax* yellow; reddish brown to brownish black dorsal maculations usually as illustrated in Fig. 7, but sometimes also with a small dark posthumeral spot; mesopleura with a single brownish black spot anteriorly; postscutellum usually darkened centrally, sometimes light brown, but rarely blackened. *Abdomen* with first segment medianly yellow, laterally dark brown; second segment dark brown, sometimes lighter antero-medianly; third segment dark brown with yellow posterior margin; fourth segment dark brown with yellow posterior margin, sometimes lighter laterally; venter yellow. *Wings* clear, veins yellowish. *Legs* yellow, tibiae sometimes and tarsi usually darker yellow to brown dorsally.

*Type*.—In the Museum of Comparative Zoology, Cambridge, Mass.

*Remarks*.—In the United States National Museum there are nearly 60 specimens of both sexes of this species. Most of these have been reared from

the egg sacs of *Argiope riparia*, or from *Latrodectus mactans*, although many records read only "from spider's nest." This species has been reared several times from mantid egg masses (Brownsville, Tex., by Vickery and St. Lucrecia, La Oaxaquena, Mexico, Sept. 1911, by Ulrich).

The species is evidently distributed throughout North America wherever *Latrodectus mactans* occurs.

ARCHEOLOGY.—*Burial area in Moyaone.*<sup>1</sup> ALICE L. L. FERGUSON. (Communicated by W. W. RUBEY.)

For the past two years the writer has been excavating the site of a large Algonkin village on the Potomac River, about eighteen miles below Washington and just below the mouth of Piscataway Creek, in Prince George's County, Maryland, and diagonally across from Mount Vernon. This is believed to have been the town of Moyaone shown on Captain John Smith's map.<sup>2</sup> Bozman<sup>3</sup> says that Moyaone "must have been somewhere about Broad Creek," and the *Handbook of the American Indians*<sup>4</sup> following Bozman, states that the location of Moyaone "was about Broad Creek." Bozman made his identification on the basis of the Smith map and apparently confused Broad Creek, which is further up stream, with Piscataway Creek. Broad Creek is little more than a bay on the river, while Piscataway Creek is wide for a considerable distance, has many little bays and tributaries and enters the Potomac at the bend just as the Smith map indicates. Mooney,<sup>5</sup> on the other hand says, "Moyaones appears, on the same map, to have been directly opposite (Tauxenent or Mount Vernon), on the Maryland side, just below the mouth of the Piscataway Creek." On Smith's map, Moyaone is diagonally across from Tauxenent. Thomas Jefferson,<sup>6</sup> in his table giving the situations of the Virginia villages, places Tauxenent in Fairfax County "about General Washington's." The Broad Creek site is not opposite Mount Vernon or Tauxenent.

Nacotchtank, shown on the Smith map, was latinized by the Jesuits into Anacostia which it is still called although now a part of the city of Washington. This makes a convenient tie point. It is futile to at-

<sup>1</sup> Received March 10, 1937.

<sup>2</sup> A copy of this map may be seen in Edward Arber's edition of Captain John Smith's works, 1608-1631. The English Scholar's Library, Birmingham, 1884.

<sup>3</sup> BOZMAN, JOHN LEEDS. *History of Maryland*. 1: 119. Baltimore, 1837.

<sup>4</sup> *The Handbook of the American Indians*. Bur. Amer. Ethn. Bull. 30 (pt. 1): 953. 1907.

<sup>5</sup> MOONEY, JAMES. *Indian tribes of the District of Columbia*. Amer. Anthropologist 2 (3): 259. 1889.

<sup>6</sup> JEFFERSON, THOMAS. Notes on the State of Virginia, p. 152. London, 1787.